

## CLEVELAND LAKE



### Introduction

Cleveland Lake is a reservoir in Huntington Canyon high on the east side of the Wasatch Plateau. It is an intermediate-sized impoundment of a meadow in a glaciated graben valley. It receives heavy recreational use and is noteworthy for fishing and scenic beauty, but is drained

every summer. The lake is named after the Castle Valley town it serves. It is also known as Cleveland Reservoir, and should not be confused with the two other Cleveland Lakes, both in the Uintas.

### Characteristics and Morphometry

Lake elevation (meters / feet)	2,685 / 8,812
Surface area (hectares / acres)	75 / 185
Watershed area (hectares / acres)	1,531 / 3,785
Volume (m <sup>3</sup> / acre-feet)	
capacity	742,600 / 6,020
conservation pool	none
Annual inflow (m <sup>3</sup> / acre-feet)	not measured
Approximate retention time (years)	1
Drawdown (m <sup>3</sup> / acre-feet)	742,600 / 6,020
Depth (meters / feet)	
maximum	17 / 56
mean	10 / 33
Length (meters / feet)	1,130 / 3,700
Width (meters / feet)	610 / 2,000
Shoreline (kilometers / miles)	4.1 / 2.5

### Location

County	Emery
Longitude / Latitude	111 14 28 / 35 34 51
USGS Map	Candland Mtn., UT 1979
DeLorme's Atlas and Gazetteer™	Page 46 D-2
Cataloging Unit	San Rafael (14060009)

The lake was created in 1909 by the construction of a long, low, earth-fill dam at the lower end of a meadow, then diverting water from Left Fork Huntington Creek to fill the lake. The dam failed in the early 1980's, and was rebuilt in 1985. The shoreline is 40% owned by the Manti-La Sal National Forest and 60% owned by the Huntington-Cleveland Irrigation Company. Public access is unrestricted. Water is consumed for irrigation and cooling at the Huntington Power Plant, but also used for recreation and cold-water aquatic habitat. In the future, if additional power plants are constructed in Huntington, more water

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will be used for cooling and less for irrigation.

# File Contains Data for PostScript Printers Only

## Recreation

Cleveland Reservoir is directly accessible from U-31 which follows the shoreline for about a mile. The lake is 19 miles east of Fairview and 29 miles northwest of Huntington. A sign on the highway identifies the lake.

The area receives heavy recreational use, especially on holiday weekends. Fishing is the primary activity, however, boating, camping, swimming, nordic skiing, sledding, and snowmobiling opportunities are also available. There are many places to launch a boat but no improved boat ramps are available..

There are no recreational facilities at the lake. Visitors are required to pack out their own trash.

Old Folks Flat, a Forest Service campground, is 9 miles southeast on U-31. It has 6 campsites and picnic tables. Usage fees are charged. There are other Forest Service Campgrounds in Huntington Canyon, on U-264, on the road to Joes Valley, and on Skyline Drive north of U-264.

## Watershed Description

The reservoir is in an area of rolling ridges and valleys characteristic of the Wasatch Plateau. Water is diverted from Lake Canyon and Spring Canyon into Cleveland Reservoir, augmenting the small natural watershed the reservoir is situated in. The canyons were glaciated during the last ice age, and are now richly covered with coniferous forests.

The watershed high point is 3,149 m (10,340 ft) above sea level, thereby developing a complex slope of 10% to the diversion. The average stream gradient above the diversion is 5% (252 feet per mile). The canal then flows 2.2 km (1.3 miles) to the reservoir. Huntington Reservoir is a large upstream impoundment.

The watershed is situated entirely on the limestone of the Wasatch Formation. The soil associations that compose the watershed are found in Appendix III.

The vegetation communities are comprised of pine, aspen, spruce-fir, oak and maple. The watershed receives 64 - 76 cm (25 - 30 inches) of precipitation annually with a frost-free season of 20 - 60 days at the reservoir.

Land use in the reservoir is 100% multiple use forest lands, used by humans for hunting, recreation and livestock grazing.

## Limnological Assessment

The water quality of Cleveland Reservoir is very good. It is considered to be moderately hard with a hardness concentration range from 111-128 mg/L (CaCO<sub>3</sub>). The only parameter that has exceeded State water quality standards for defined beneficial uses is

### Limnological Data

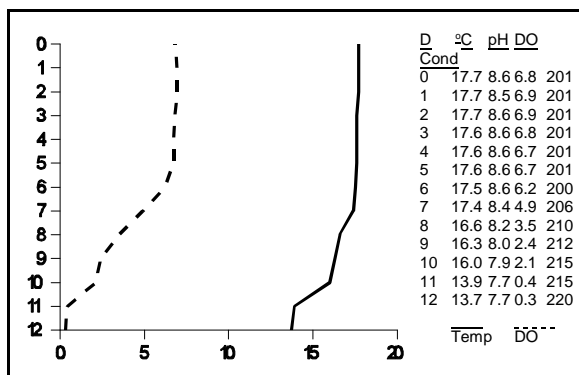
Data sampled from STORET site: 593205

<b>Surface Data</b>	<u>1981</u>	<u>1989</u>	<u>1991</u>
Trophic Status	E	M	E
Chlorophyll TSI	-	47.93	60.01
Secchi Depth TSI	54.16	47.69	53.68
Phosphorous TSI	47.35	29.37	41.14
Average TSI	50.76	41.66	51.61
Chlorophyll <i>a</i> (ug/L)	-	5.85	20.05
Transparency (m)	1.5	2.35	1.55
Total Phosphorous (ug/L)	10	6	13
pH	8.6	8.7	8.7
Total Susp. Solids (mg/L)	5	-	6
Total Volatile Solids (mg/L)	-	-	8
Total Residual Solids (mg/L)	-	-	<3
Temperature (°C / °f)	14/57	15/59	12/53
Conductivity (umhos.cm)	217	230	204
<b>Water Column Data</b>			
Ammonia (mg/L)	0.1	0.03	0.03
Nitrate/Nitrite (mg/L)	0.27	-	0.07
Hardness (mg/L)	128	-	110
Alkalinity (mg/L)	121	-	104
Silica (mg/L)	-	-	1.7
Total Phosphorus (ug/L)	10	8	20
<b>Miscellaneous Data</b>			
DO (Mg/l) at 75% depth	7.7	5.5	2.4
Stratification (m)	3-6	7-9	10-11
Limiting Nutrient	P	N	N
Depth at Deepest Site (m)	13	9.7	12

phosphorus. The average concentration of total phosphorus in the water column in 1989 and 1991 was 7.6 and 20.5 ug/L which is under the recommended pollution indicator for phosphorus of 25 ug/L. The average phosphorus concentration for the water column in June, 1991 and the concentration near the bottom of the lake in August, 1991 did exceed the State standard. Although there was a significant increase in the concentration of total phosphorus from 1989 to 1991 additional data will be needed to evaluate this potential trend for phosphorus concentrations. Dissolved oxygen concentrations in late summer substantiate the fact that water quality impairments do exist. In 1981 the reservoir was characterized as a phosphorus limited system. The 1989-91 data suggest that the reservoir is currently a nitrogen limited system. TSI values indicate the reservoir is eutrophic except for 1989 when the reservoir was classified as mesotrophic. The phosphorus concentrations in 1989 appear to be abnormally low (5.8 ug/L) and have shifted the overall TSI index to the low mesotrophic range. It does not appear that there has been a significant rise in the concentrations of nutrients in the lake since it was

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originally surveyed in 1981. In fact the concentration may have declined specifically the nitrogen species. However, there is insufficient data to determine if the lake is stable or what is the eutrophication trend in the lake. As additional data is obtained a more substantial determination regarding the trophic status of the reservoir may be obtained. The reservoir has always stratified during the summer. The profile of August 29, 1991 indicates that a thermocline developed at the depth of 10-11 meters. Consistent with the stratification there was a noticeable decline in the concentration of dissolved oxygen in the water column. Below 6 meters the concentration declines to a low of 0.3 mg/L at the bottom. These conditions are deleterious to the fishery rendering approximately 1/3 of the water column unsuitable for a fishery. Dissolved oxygen concentrations may reach a critical state during the winter period for fish. In addition the reservoir may be completely drained prior to winter to meet the irrigation demands downstream.



The reservoir was treated by the DWR in 1959 for rough fish control, so native fish populations are not present.

Phytoplankton in the euphotic zone include the following taxa (in order of dominance)

Species	Cell Volume (mm <sup>3</sup> /liter)	% Density By Volume
<i>Sphaerocystis Schroeteri</i>	58.102	98.20
<i>Fragilaria crotonensis</i>	0.916	1.55
<i>Dinobryon divergens</i>	0.073	0.12
<i>Oocystis sp.</i>	0.050	0.08
Pennate diatoms	0.027	0.05
Total	59.168	
Shannon-Weaver [H']	0.10	
Species Evenness	0.06	
Species Richness	0.19	

As observed the phytoplankton community is dominated by green algae with a significant amount of the diatom

*Fragilaria crotonensis*.

### Information

#### Management Agencies

Manti-La Sal National Forest and Price Range	817-2817
Six County Commissioners Organization	896-9222
Division of Wildlife Resources	538-4700
Division of Water Quality	538-6146

#### Recreation

Castle Country Travel Region (Price)	637-3009
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#### Reservoir Administrators

Huntington-Cleveland Irrigation Company	687-2505
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### Pollution Assessment

Nonpoint pollution sources include grazing and recreation. About 1,000 sheep graze in the immediate vicinity of the reservoir for two weeks each year. Cattle also graze the area.

There are no point pollution sources in the watershed.

### Beneficial Use Classification

The state beneficial use classification for the waters of Cleveland Reservoir include: boating and similar recreation (excluding swimming) (2B), cold water game fish and organisms in their food chain (3A), and agricultural uses (4).

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